"We need a census of the fauna and flora that extends beyond the vertebrates and flowering plants to the teeming populations of smaller organisms ... from insects to fungi and eventually microbes.... Any one of those species ... could be a keystone species."

Edward O. Wilson, Discovery 2000 Conference

Taking Stock of Biodiversity

NPS PHOTO BY MICHAEL WILDERMAN

Funded by the Natural Resource Challenge, vascular plant surveys at Thomas Stone National Historic Site brought to light rich biodiversity in 2001 and 2002. Resource specialists with the National Park Service documented 375 plant species in the small historical park, including many that are listed as rare or newly recorded in Maryland. (The image depicts NPS Biologist Brent Steury conducting a vascular plant survey in Anacostia Park, Washington, D.C.)

The National Park Service is beginning to take stock of the biological diversity—the variety of species, ecosystems, and genetics—preserved in the national parks. For several years the Natural Resource Challenge has provided critical funding for nationally coordinated, systematic biological inventories of vascular plant and vertebrate animal species. These surveys are under way throughout the National Park System, and a few highlights are reported in this chapter. Adding to this emerging knowledge are independent park studies and the partnership-oriented All Taxa Biodiversity Inventory, a model developed at Great Smoky Mountains National Park that is being replicated at other national parks. These scientific efforts are developing important, basic information for improved park management. The surveys being undertaken today throughout the National Park System are a good start, but eventually, comprehensive inventories of all life-forms will be necessary to gain a thorough understanding of how species interrelate and how they function in self-sustaining ecosystems. As the best examples of remnant ecosystems, national parks are particularly well suited to the scientific exploration of biodiversity. This role will only become more important in the future and is vital to park preservation today.

New and rare species found in small Maryland park

by Brent Steury and Betsie Blumberg

THOMAS STONE NATIONAL HISTORIC SITE IS A small cultural park in Maryland. It occupies 322 acres of fields and woodlands with upland seeps and pocket wetlands. In the past, management has focused on cultural resources. However, the Natural Resource Challenge is expanding that focus and the park's natural resources are now being inventoried. In fall 2001 and spring and summer 2002, inventories of vascular plants at the park identified several state-listed rare, threatened, and endangered species.

"Natural resource inventories are bringing to light the locations of rare, threatened, and endangered species."

The initial preliminary vegetation community classification study was conducted by a team of natural resource specialists led by Chris Lea of Assateague Island National Seashore. It was undertaken to produce vegetation descriptions for a vegetation map of the park as part of the NPS National Vegetation Mapping Program. That study was followed by a three-day survey by Brent Steury, biologist with National Capital Parks–East, who added 178 plant species to those reported in the preliminary study and also noted some state-listed rare insects.

Sedges are common in wet places. One species, *Carex styloflexa,* bent sedge, previously recorded as rare in Maryland, was found in sufficient numbers at Thomas Stone and other Maryland parks that it is no longer listed. However, two new-to-Maryland varieties of *Carex* were observed in the surveys at the park. Two other sedges recorded are listed as "watchlist" (21 to 100 occurrences in Maryland) and "status uncertain," respectively.

Two trees listed as state rare species, *Gymnocladus dioica* (Kentucky coffee tree) and *Juglans cinerea* (butternut), were observed. These were apparently planted around the historic Thomas Stone home. Two wildflowers, an endangered Asteraceae and a Boraginaceae listed as "state rare (6 to 20 occurrences) to watchlist" were recorded. And of particular interest, a grass believed to be extirpated in Maryland was noted growing near, but not within, the park, a find that represents the only known population of that fescue in the state.

A butterfly, *Hermeuptychia hermes,* listed as "state rare to watchlist" was sighted during the plant inventory in May. This was the earliest known observation of the Carolina satyr butterfly in Maryland. Four individuals were seen, documenting its status as a resident breeding species. On the same day, a dragonfly, Uhler's sundragon *(Helicordulia uhleri)*, listed as "watchlist" was sighted. Another dragonfly, the calico pennant *(Celithemis elisa)*, was observed to be common at the park during the June plant inventory. This was a first record for Charles County, Maryland.

The ranking system used here was developed by The Nature Conservancy and has been adopted by all 50 state Natural Heritage Programs. Natural resource inventories are bringing to light the locations of rare, threatened, and endangered species. In small parks like Thomas Stone, natural resource treasures are being discovered. Managing this information requires resolving a conflict between two National Park Service commitments: sharing scientific information and protecting the species. This issue is being addressed as the protocol for managing these data is developed. Meanwhile, at Thomas Stone, inventories of mammals, reptiles, and amphibians are under way, and birds and fish will be next. ■

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Uncharted territory: Exploring life in Yellowstone National Park's hot springs

by Ann Rodman and Kendra Maas

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Biological Science Technician Kendra Maas samples hot water organisms in Yellowstone National Park. Adapted to extreme environments, filamentous bacteria (inset, top), layered bacterial mats (inset, bottom), and other microbes are virtually unexplored in the park. The inventory will help protect this valuable resource and improve our understanding of these amazing and potentially beneficial organisms.

YELLOWSTONE NATIONAL PARK IS HOME TO THE most varied and largest intact geothermal area in the world. High-temperature natural systems comprising spectacular geysers, hot springs, mud pots, and steam vents include a virtually unexplored wealth of living organisms that have the potential for remarkable scientific, social, and economic benefits. In 2002, with funding from the Natural Resource Challenge through the NPS Biological Resources Management Division, Yellowstone embarked on a collaborative, multiyear research effort with Portland State University and the University of New Mexico to create a baseline inventory of the microbial communities in geothermal areas throughout the park.

"High-temperature natural systems … include a virtually unexplored wealth of living organisms that have the potential for remarkable scientific, social, and economic benefits."

Yellowstone National Park has been inventorying the chemical and physical characteristics of its geothermal ecosystems for years; however, very little is known about the biodiversity, ecology, and distribution of the thermophiles within these systems. Thermophiles are microorganisms that thrive in high temperatures and, in Yellowstone National Park, extremes of pH. In 1996 the list of thermophiles in the park included only 35 species. Park staff searched the scientific literature in 2000 and 2001 for information about park thermophiles. Documented in the literature were 406 organisms from 105 different pools, meaning that fewer than 1% of the park's hot springs have been studied for thermophiles!

Research efforts got under way to correct this gap in spring 2002. The research team began by testing collection protocols and refining laboratory techniques using 18 samples taken from park thermal areas. Until the early 1990s, measurement of microbial species diversity was restricted to the small (<1%) portion of microorganisms that could be grown in petri dishes. This limitation has been partially alleviated by the development of molecular techniques based on gene sequences in small pieces of ribosomal RNA that allow for the characterization of microorganisms without the need to grow them in the laboratory.

The 18 samples were analyzed to reveal 71 unique gene sequences. Each gene sequence represents a distinct organism. These sequences were then compared with all sequences listed in GenBank, a large database of gene sequences hosted by the National Institutes of Health. Fifty-eight of the 71 sequences matched a known organism in GenBank. Some of the remaining 13 sequences will represent previously unknown organisms.

In summer 2002 the research team chose 300 sampling locations from a database of 6,500 possible sites. The sampling sites represent the full range of pH and temperature combinations found in the park. From June to September the team collected 216 samples from 5 of the park's 12 major thermal areas. Digital photographs and biomass samples were taken at each site in addition to readings of pH, temperature, and precise location. Samples showed a wide variation in pH levels, from 1.7 to 9.3. In the fall the ribosomal RNA was extracted and analyzed from 80 of the 216 samples. The results will set priorities for sampling during summer 2003.

The process of inventorying the biological characteristics of Yellowstone National Park's thermal areas is crucial to developing a thorough understanding of the kinds of organisms that live in these high-temperature systems and how they change over time. Good science will allow park managers to identify and address threats that can alter these ecosystems and change the composition of microbial communities, including low aquifer recharge rates, landslides, floods, energy development, and visitor impacts. Until a baseline inventory is accomplished, some amazing, and potentially beneficial, organisms will have incomplete protection simply because their existence is not known. ■

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Bat inventory at John Day Fossil Beds National Monument

by Lisa Garrett

BEFORE 2002, BIOLOGISTS HAD LITTLE knowledge about the bat species inhabiting John Day Fossil Beds National Monument in eastern Oregon. This lack of information made it difficult for resource managers to know how any of the bats were faring in the park. Thanks to funding from the Natural Resource Challenge, researchers from the University of Idaho, working under a cooperative agreement with the National Park Service, documented 14 bat species during the 2002 mammal inventory at the monument.

"The success of the 2002 bat inventory illustrates how well the Natural Resource Challenge is enabling the National Park Service to take a leading role in the preservation of North American biodiversity."

The objective of the inventory was to document 90% of the potential mammal species in the monument. Special emphasis was placed on bats in 2002 because they comprise a significant proportion of the mammal species thought to reside in the monument. The inventory resulted in the documentation of all the species of bats expected to occur in eastern Oregon.

Inventory biologists sampled bats using mist nets and an ultrasonic detection system called AnaBat to identify bats by echolocation calls. The AnaBat II Bat Detector is part of a system that records the signals of bats for computer analysis. The ultrasonic echolocation signals of bats are converted by the system into electronic signals that can be recorded and processed to assist with the identification of the species. Biologists identified bats captured in mist nets and recorded their echolocation calls as the bats were released and flew overhead. Biologists used this library of recorded calls to compare the calls of bats that were recorded but not captured with calls emitted from positively identified bat species.

The pallid bat *(Antrozous pallidus)*, silver-haired bat *(Lasionycteris noctivagans)*, Yuma myotis *(Myotis yumanensis)*, and Townsend's big-eared bat *(Corynorhinus townsendii)* are listed as "species of concern" by the U.S. Fish and Wildlife Service and as threatened or vulnerable species by the State of Oregon. These species are targets for a research study in summer 2003, which is being funded as part of this inventory effort. Biologists from the University of Idaho will use radiotelemetry techniques to locate summer maternity roosts, temporary night roosts, and sites of winter hibernation for the designated bat species of concern.

John Day Fossil Beds National Monument is an ideal area to focus bat conservation efforts for a number of reasons. The monument itself contains abundant natural and artificial structures that are well suited for both summer and winter use by bats. It also has as a primary management objective the conservation of natural and historical resources and is actively engaged in ecological restoration of riparian and upland vegetation, which bats rely on for roosting and foraging. Because the monument consists of three widely separated parcels of land that are situated within a matrix of federal and tribal lands, bat conservation within the monument can contribute to maintaining healthy bat populations in adjacent landscapes where natural resource conservation is a top management priority.

The 2002 bat inventory project, in combination with additional research in summer 2003, will give researchers critical information on roost locations and habitat characteristics. This knowledge will enable National Park Service staff to address the conservation needs of local bat populations. Information from the inventory and telemetry work can be used to direct monitoring and conservation activities at roosts. Potential disturbance from recreation, paleontology, prescribed burning, and other monument activities can also be minimized with information from this project. The success of the 2002 bat inventory illustrates how well the Natural Resource Challenge is enabling the National Park Service to take a leading role in the preservation of North American biodiversity. ■

Listed as a species of concern by the U.S. Fish and Wildlife Service, the pallid bat was one of 14 bat species inventoried at John Day Fossil Beds National Monument. The study and additional research in 2003 will give managers important information on roost locations and habitat characteristics for local bat populations.

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The status of endangered species in national parks: An update

by Loyal A. Mehrhoff and Peter A. Dratch

"More than $1.5 million has been added to park base budgets to enhance programs for conserving endangered species."

THE NATIONAL PARK SERVICE PLAYS A KEY ROLE in restoring plants and animals protected under the U.S. Endangered Species Act. In 2002, 364 federally listed species of plants and animals occurred on lands managed by the National Park Service. An additional 56 species on NPS lands are either proposed for or are candidates for listing; 4 species are managed by the Park Service in a manner that precludes the need for listing (Table 1). Plants comprise the largest group of listed species in the national parks, although a large number of mammals, birds, and fish are also listed (Table 2). Parks in Hawaii, California, and the Southeast contain the greatest number of listed species (Table 3).

In FY 2002, the Natural Resource Challenge provided significant funding to help endangered species. More than $1.5 million has been added to park base budgets to enhance programs for conserving endangered species. In addition, the Natural Resource Preservation Program funded $1.6 million for projects benefiting listed species. These funds are being used to hire additional resource managers and to undertake projects that benefit endangered species. Numerous park projects have benefited from the increases: 20 threatened and endangered plant species in Hawaii Volcanoes National Park are being stabilized; endemic fox populations in Channel Islands National Park are being protected; migrating loggerhead sea turtles are being tracked by satellite; caves important to bats are being gated for protection; populations of wolves, northern spotted owls, and bull trout are being monitored; and populations of seabeach amaranth, harperella, red-legged frogs, and greenback cutthroat trout are being reestablished.

Providing national coordination on threatened and endangered species in the National Park System, the NPS Endangered Species Program accomplished two key goals in 2002. First, staff developed a database detailing the status and trends of endangered species in each park. This database allows the national office, regional offices, and parks to better understand

Table 1. Number of species in the National Park System managed under provisions of the Endangered Species Act

Status	Number of Species
Endangered	261
Threatened	96
Experimental	7
Proposed	4
Candidate	52
Managed via Conservation Agreement	4
Total	424

Table 2. Number of federally listed, proposed, and candidate species in the National Park System by group

Group	Number of Species
Plants	181
Mammals	56
Birds	59
Reptiles	22
Amphibians	6
Fish	50
Insects	13
Snails/Mollusks	33
Other Invertebrates	4

Table 3. Areas in the National Park System with the greatest number of federally listed, proposed, and candidate species

Park	Number of Species
Haleakala National Park (Hawaii)	50
Hawaii Volcanoes National Park (Hawaii)	41
Golden Gate National Recreation Area (California)	35
Channel Islands National Park (California)	34
Point Reyes National Seashore (California)	28
Kalaupapa National Historical Park (Hawaii)	23
Everglades National Park (Florida)	22
Santa Monica Mountains National Recreation Area (California)	21
Natchez Trace Parkway (Mississippi)	21
Mammoth Cave National Park (Kentucky)	16

Table 4. Population trends of federally listed, proposed, and candidate species in the National Park System

Status Trend in National Parks	Number of Populations	Percentage of Populations
Not at risk	90	8.9
Stable	204	20.0
Increasing	86	8.5
Declining	96	9.5
Extirpated	187	18.4
Unknown	352	34.7
Total	1,015	100.0

the overall success of the National Park Service in protecting and restoring endangered species. For example, the information shows that approximately 37% of the known populations of listed and candidate species in parks are either stable, improving, or not at risk; but it also shows that the status for at least 350 populations has not been determined (Table 4). Using the database, managers can identify species in decline and propose appropriate management actions. As systematic efforts to gather this information continue, the National Park Service will be able to assess how these data are changing and how much progress is being made toward recovering species. Second, the program received funding to collect and store seeds from endangered plants for future use in restoration. The National Park Service intends to collect and store seeds from more than 150 endangered, proposed, and candidate plant species and is cooperating with the USDA National Center for Genetic Resources Preservation (National Seed Storage Laboratory) and the Center for Plant Conservation in this effort.

In the future the National Park Service will increasingly emphasize improving the status of declining species and restoring species that have been extirpated from parks. The overall goal is to make national parks as biologically whole as possible—to maintain current park species and restore them when it makes sense to do so. ■

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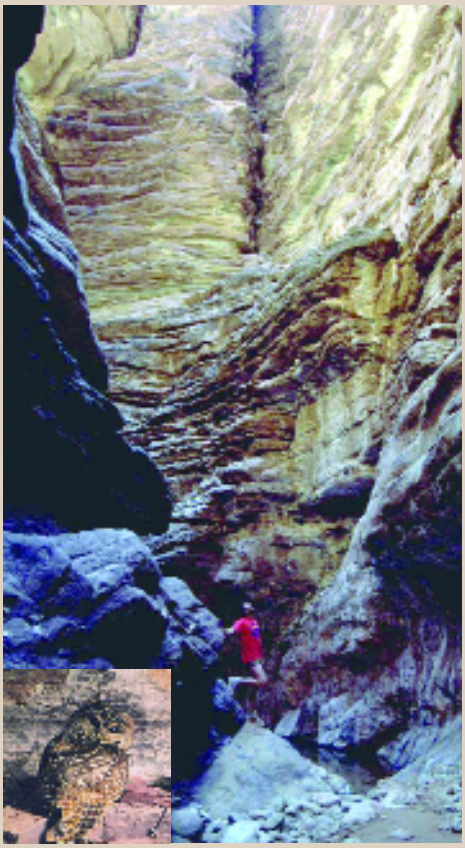
NPS PHOTO (BOTH)



Mexican spotted owl survey at Grand Canyon

by R. V. Ward

The Mexican spotted owl *(Strix occidentalis lucida*, inset*)*, federally listed as threatened in 1993, has long been considered by scientists to be a resident of old-growth coniferous forests in the Southwest. Owl surveys at Grand Canyon National Park in 2001 and 2002, however, uncovered 53 Mexican spotted owls in rugged, rocky canyon habitat. Finding this number of owls living in an unusual habitat type represents a significant increase in the known population of this species in Arizona.

Roosts and nests were generally located on rock shelves rather than in the few coniferous trees available. Field crews reached remote backcountry locations on extended backpacking trips and on seven raft trips through the Grand Canyon on the Colorado River. Owls responding to human imitations of their characteristic four-note hoots frequently came within 10 feet of the surveying crews. Surprisingly, several owls were also located below the canyon rims immediately adjacent to the park's developed areas.

These findings resulted in the establishment of 39 Protected Activity Centers surrounding the owl locations, ranging from 700 to 1,000 acres and subject to the management recommendations contained in the Mexican Spotted Owl Recovery Plan. The data have also facilitated consultation with the U.S. Fish and Wildlife Service as required under the Endangered Species Act for the numerous development projects under way at Grand Canyon National Park, including a trail system expansion and improvements in the transportation system. This project, which was supported by a Natural Resource Preservation Program, exemplifies the important link between good science and sound resource management in the National Park System. ■

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Hopes high for condor nesting success

by Elaine F. Leslie

Biologists' hopes ran high in 2002 for breeding California condors in Grand Canyon National Park, Arizona. In March, following months of observing condor courtship and attempts to locate appropriate caves and ledges for nesting, park biologists confirmed that two pairs of condors were nesting just off the South Rim in clear sight of biologists and the public.

Condors typically lay one egg and incubation lasts 60 days. The park organized a Nestwatch Program; more than 20 volunteers from across the state recorded incubation shifts and foraging behavior of the four adult birds from sunrise to sunset. For the first time park staff had an opportunity to collect behavioral data on condors nesting in the Arizona wilds.

The nests faced each other on opposing cliffs, and nest watching became an interpretive event. National Park Service biologists provided scopes and binoculars and helped park visitors view the nests. Just days before the hatching, biologists and the public watched as condor incubation shifts ceased abruptly for both pairs, indicating nest failures.

Biologists were not surprised by the failed nests because the parent condors were young and inexperienced. Other possible causes of the failed nests include attacks by predators such as ravens and the parents' possible exposure to lead in the environment, which can affect egg viability. Rangers rappelled to one of the failed nests and retrieved eggshell frag-

Small parks, big biodiversity

by Brent W. Steury

Inventory efforts under way throughout the National Park System highlight the biological importance of small parks. Piscataway and Fort Washington Parks in Maryland are no exception. From 1995 to 2002 the park biologist at National Capital Parks–East undertook an inventory of vascular plants for both national parks. Although the combined area of the two parks is just 4,800 acres, the inventory yielded a total of 988 vascular plant taxa, representing 973 species. A voucher specimen, a sample deposited in the park's herbarium, or photographic documentation was obtained for each taxon. Additionally, historical occurrences of plants were determined through searches of other local herbaria.

Discovering such a rich diversity of plant life only 10 miles south of the nation's capital was surprising. Less surprising was the discovery that nonnative plants comprised 25.3% of the parks' vascular flora. Seventeen species are known only from historical records and 31 plants are listed as endangered or threatened by the State of Maryland. An additional 49 species located during the survey are included in the state list of rare, threatened, or endangered plants of Maryland, with state rankings from uncommon to highly rare.

A paper containing the complete vascular plant species list for Piscataway and Fort Washington Parks and descriptions of the plant communities, historical land use, and physiography of the parks will be published in a 2003 edition of the journal *Castanea*. Park resource managers will use the inventory results in future vegetation mapping projects, exotic plant control efforts, and long-term monitoring of rare plant populations. ■

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Maroon Carolina milkvine *(Matelea carolinensis)* is one of 31 species documented in the inventory that has state endangered or threatened status.

ments for laboratory analysis. They also recovered pieces of bone from the late Pleistocene and historical times, evidence that condors inhabited the same nest site 10,000–11,000 years ago and in the late 1800s.

One of the most endangered birds in the world, the condor was reintroduced to northern Arizona in 1995 in an effort to restore this component of the ecosystem that had been absent for more than 100 years. Because of this endeavor there are now 33 wild condors in Arizona. Although challenges still face the program, biologists are eager for the 2003 breeding season, as four pairs of condors will be of breeding age. Two pairs have already returned to the 2002 nesting sites and a third nest has been located on the North Rim. The fourth nest remains to be found. ■

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AWARD-WINNER PROFILE

Brewster leads Yellowstone through precedent-setting issues

NPS PHOTO

Wayne Brewster

Wayne Brewster's leadership ability has allowed him to set precedents. This talent also brought him something else: this year's Director's Award for Natural Resource Management.

Wayne came to Yellowstone National Park in 1991 when the park faced some of the most contentious and complex issues in its history. Although some people would have shuddered at the challenges, Wayne considers himself lucky. "I've been fortunate to be in the right place at the right time. I've been a part of projects that will make a difference for a long time, and that's the rewarding part." Wayne had two particularly complex missions on his agenda and tackled them both with success.

First was the reintroduction of wolves into Yellowstone. The year 2002 marked the eighth year of the experiment and the third successive year in which more than 30 pairs have reproduced throughout the Rocky Mountain recovery area, thus preparing the animal for possible removal from the threatened species list. This project started when Wayne collaborated with the U.S. Fish and Wildlife Service to author the environmental impact statement, which drew the largest public response (280,000 comments) in the Department of the Interior's history. Nearly all the predictions in the statement have been fulfilled except two: the anticipated time and cost were inaccurate. Wayne has overseen a program that is ahead of schedule and under budget.

The second mission was completion of an interagency bison management plan, which had begun a decade earlier. Bison carry brucellosis, a disease that can cause fetal abortions in cattle. Until 2000, when cold weather forced bison outside the park, the Montana Department of Livestock and Department of Wildlife and Parks, and NPS staff at Yellowstone summarily killed these animals. But in 2000, Wayne's efforts to change this system paid off when the plan was implemented. The plan balances the goals of reducing the risk of transmission of brucellosis to cattle with the preservation of 2,300–3,000 free-roaming bison. Although some bison that leave the park may continue to be killed, they are first tested for brucellosis. Those testing negative may be allowed to remain outside the park in limited numbers in special management zones.

Wayne has been described as the "field commander" for his involvement in both of these long-pressing issues. ■

Discovering life in the national parks

by Ben Becker and Christie Denzel Anastasia

"If we were to visit another planet the first thing we would do is conduct a systematic inventory of that planet's life. Oddly, enough, we have never done that for our own planet."

—Edward O. Wilson

As the National Park System becomes an increasingly important repository for many of North America's disappearing species, the National Park Service has made inventorying biological diversity a priority. An emerging model for inventorying life in national parks is the All Taxa Biodiversity Inventory (ATBI), an inventory system that documents *all* the organisms in a natural system. The information generated through the ATBI process is used to develop conservation and management strategies. The successful implementation of an All Taxa Biodiversity Inventory at Great Smoky Mountains National Park, Tennessee and North Carolina, has spurred Point Reyes National Seashore in California to do the same. In 2002, Point Reyes began the National Park Service's first *marine* ATBI.

The Pacific Coast Learning Center at Point Reyes National Seashore organized more than a dozen community groups, scientists, and educators to initiate an ATBI process for Tomales Bay, California. Although threatened by pollution, sedimentation, and invasive species, Tomales Bay remains one of the most pristine bays on the West Coast of North America. The bay provides critical habitat for many

Dr. Jim Halfpenny, coauthor of the Lynx project study and animal track expert, examines possible lynx tracks found near Mud Volcano in Yellowstone National Park. Gait patterns, stride, and straddle measurements help wildlife researchers determine if the tracks belong to lynx.

Found: The missing lynx!

by Kerry Murphy

Biologists continue to find positive evidence of Canada lynx *(Lynx canadensis)* presence in Yellowstone National Park (Wyoming, Montana, and Idaho). In February 2002 they found probable tracks of this federally listed threatened species during snow tracking surveys, and at the end of April, mitochondrial DNA samples from the previous summer's hair-snaring survey tested positive for Canada lynx. Further tests confirmed that the hair-snared lynx was female.

The biologists collected the hair sample using the National Lynx Detection Protocol developed by scientists at the Rocky Mountain Research Laboratory at the University of Montana. Under the protocol, each transect consists of five stations spaced at 100-meter intervals. In 2001, biologists deployed 32 hair-snare transects. Each station comprises a hair-snare, which is a 4x4-inch carpet square with small nails and ground catnip leaves, placed 18 inches above ground, and a scent pad consisting primarily of oil from beavers hung nearby. Attracted to the scent pad, lynx rub against the hair-snare. Samples are collected by biologists at two-week intervals, stored in vials with a drying agent, and then sent to the university's Carnivore Conservation Genetics Laboratory for DNA analysis. There, DNA is chemically extracted and specific regions of the DNA molecule are replicated using a polymerase chain reaction. Restriction enzymes and a gel are used to identify DNA fragments that originate from lynx. If needed, additional tests can be used to estimate the cat's sex.

Yellowstone National Park managers hope for continued success in locating lynx as they enter the third year of a three-and-a-half-year survey. ■

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species and natural communities. The project has already secured more than $85,000 in nongovernmental grants, established science and education teams, and begun collecting data on birds, mammals, algae, invertebrates, and fish. Plans are also under way for mudflat monitoring by high school students, and an invertebrate "bioblitz," an opportunity for taxonomic specialists to rapidly identify collected species. This systematic inventory will help preserve species and habitats, inspire stewardship through participation in education initiatives, and create a model for marine biodiversity research. ■

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